

SUSTAINABLE VILLAGE

A stylized graphic of a sun with long, white, pointed rays. The sun's face is a semi-circle composed of yellow and orange segments. In front of the sun, there is a green hill with three blue houses of varying sizes. The entire graphic is set against a dark blue background.

**Village Power
Sustainability
Workshop:
Productive Uses of
Village Solar Power**

**Presented by
Michael Sullivan**

**Critical Thinking, Appropriate Technology and
Strategic Action for Sustainability Projects Worldwide**

education

Solar

ecology

SHARING

networking

Work in Remote Villages since 1966



**Renewable
Energy and
Appropriate
Technology
Projects in over
130 countries**



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Projects with the PRC since 1979



Remote Shelter



Importing to the USA



Education, Qinghai, TAR

Health
Care,
Qinghai



Agriculture, Guizhou



Hydro, Zhejiang



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Productive Uses of Solar Energy

More
Jobs

Education

Resources

Medical Care

Natural Capital

Less

Urbanization

Illiteracy

Poverty

Hunger

Crime



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Microenterprise

... solving problems with
the business model.



Solutions that:

Create jobs

Improve health

Increase literacy

Inspire hope and confidence

Solve environmental problems



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An example



Start with a Problem



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Desertification

**2 billion people in danger
Every year 15 million acres
and 40 billion US\$ lost**



Burning dung for heating and cooking

- Creates lung problems
- Promotes eye infections
- Decreases soil fertility
- Requires extensive time to gather, dry, and burn



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Finding the causes



Women in many areas spend 10 hours per day gathering firewood or dung



Often over 75% of cut wood is used for cooking and heating water, over 80% in Africa, higher where used for heating

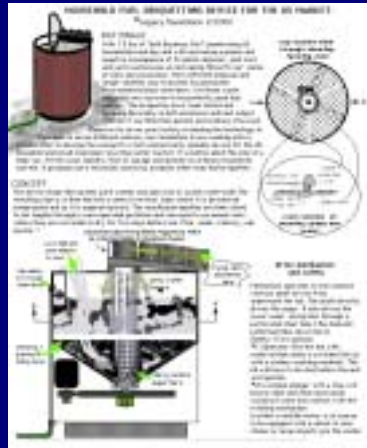


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Look for solutions that create jobs

Briquetting



- Clean burning
- Saves trees
- Health benefits
- Saves dung for agriculture
- Recycles waste materials
- Creates jobs for making the press, the briquettes, gathering materials, selling, and delivering



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Making Briquettes



Ordinary leaves, grass, straws and other ag residues are pounded or chopped, then decomposed to the point where they deform plastically when squeezed.



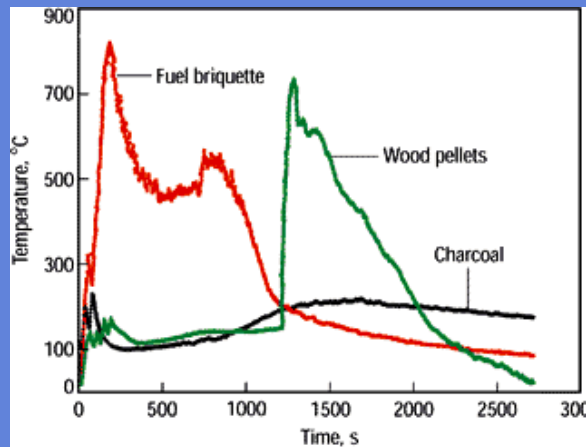
The residues are then blended into a sludgy mash using plain water, then sloughed into cylindrical molds. The molds are then compressed into a donut shaped cake which is next air dried for the several days before distribution and use. Briquettes weigh about 140 gm and burn between 30 and 90 minutes, depending upon the recipe used to meet local market consumer preferences.



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Briquette Applications

40% more
efficient than
firewood,
hotter and
longer burning



In the open fireplace or campfire early and midway into the burn cycle



Roasting chicken in a brazier or frying french fries in a metal stove



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More job-creating solutions to environmental, health, and educational problems



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Solar Installation, Maintenance

For lack of a fuse or inexpensive part, thousands of PV systems worldwide don't work



By using development funds to encourage private enterprise, installers have an economic incentive to learn about repair and maintenance, stock spare parts, and be ready for upgrade and expansion work.

Encouraging sustainability through the business model



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Medical Clinics



Nomads in Xining waiting for medical attention

Complete medical clinics “in a box”

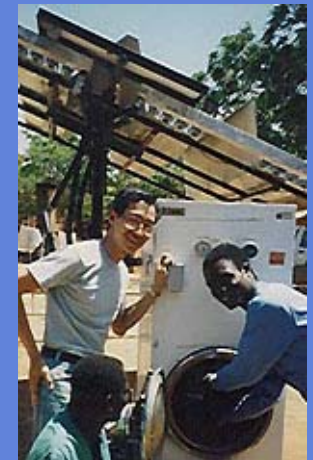


Portable vaccine



Supplies for remote areas

Solar autoclave



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Battery Charging Station

**Deep Cycle
Batteries**



**Flashlight
Batteries**

Lanterns



People drop off
their batteries in
the morning,
pick them up on
their way home
at night



Central Station



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Working Eco-Tourism Learning

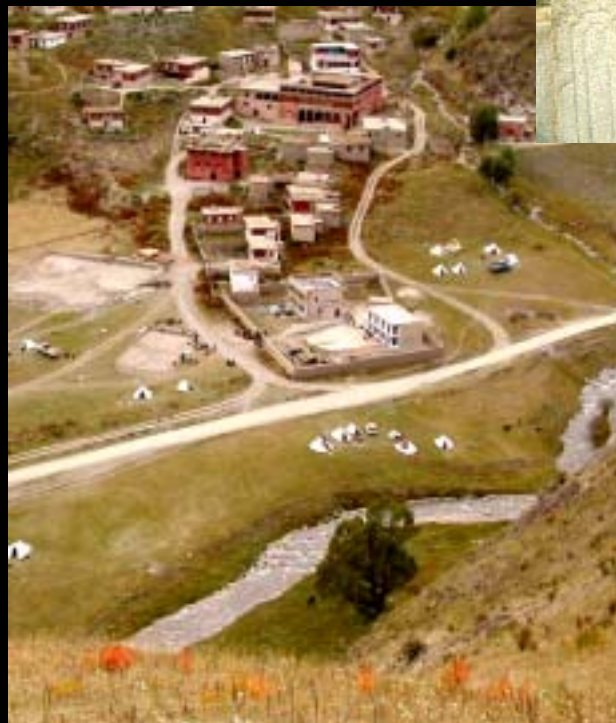


**Volunteers
helping with
village projects,
learning, teaching,
and helping**



AT services for tourists

**Income for villagers
supplying services -
light, hot water, purified
water, warm and
comfortable
accommodations, food.
Income from selling
local crafts, charging
for local cultural
performances**



**Sister
Village
Projects**



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Fishing



**"Give a man a fish
and he eats for a
day; teach a man to
fish and he eats
forever."**

**What kind of new
"fishing poles"
could solar
electricity provide
for remote
villagers?**



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Drip Irrigation

50% less water

30-50% more yield

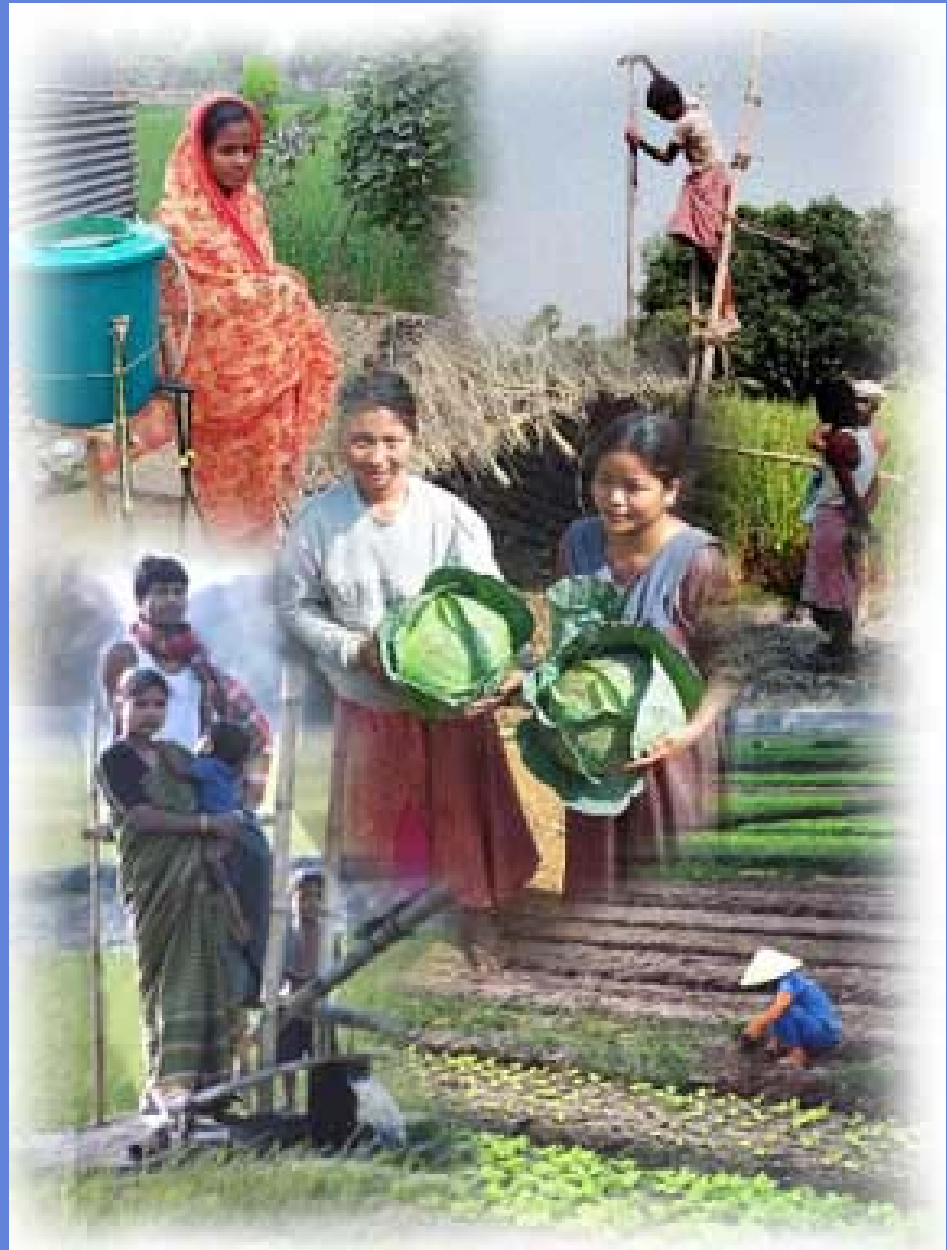
Doesn't water
weeds

Roots grow deeper

Little evaporation

Better cultivation

Saves time



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Solar Crop Drying



Solar drying –

- saves up to 30%
- helps stop deforestation
- less pollution
- more value to farmers
- more jobs in rural areas
- less urbanization



**Solar fans for
separating wheat from chaff**

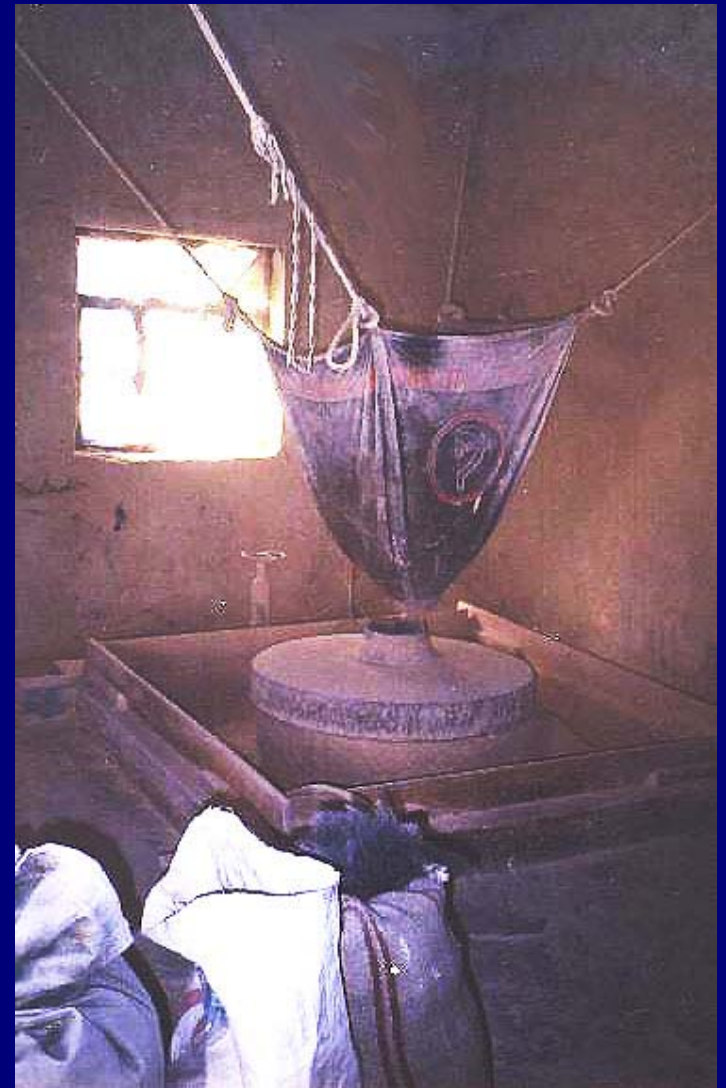
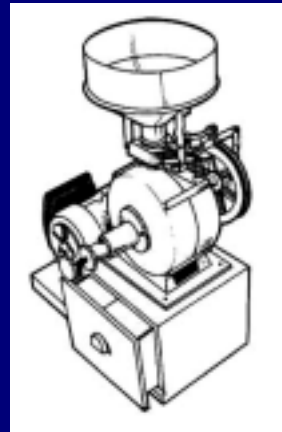
**Winnowing
with tarps**

- causes medical eye problems
- doesn't work in wet weather
- losses to mold, insects, and animals



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Solar Grain Grinding



Traditional Method



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Solar Grain Grinding

Hand-powered grinder
15 lbs. = 1 day's work
100 lbs. Corn = 3 days



Solar-powered grinder
15 lbs. = 10 minutes
100 lbs. corn = 15 min.

300 Villages in Africa
400% more Literacy in 1 year
Jobs for many people
Higher quality results



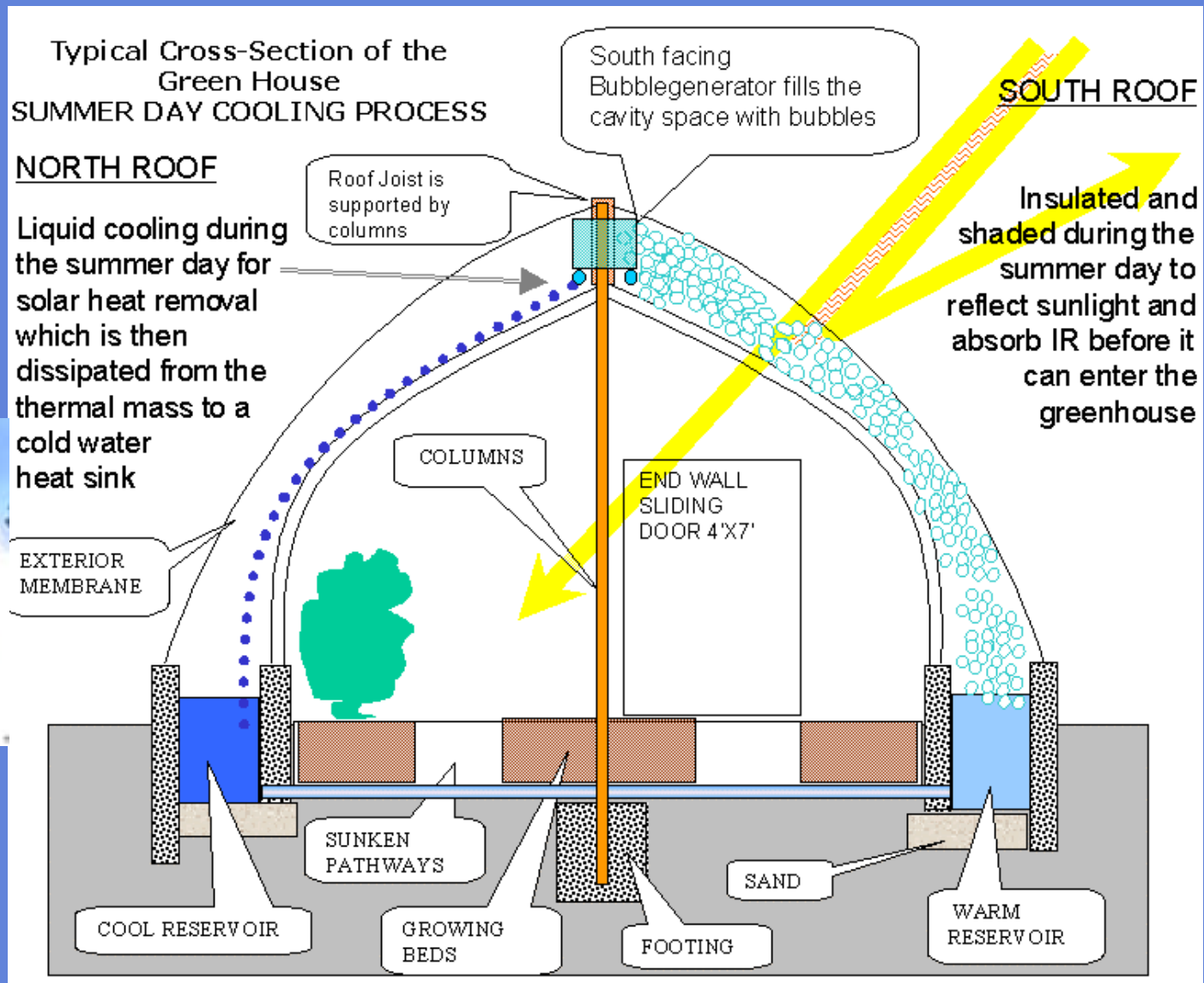
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Solar Greenhouses

More Food
Less Energy
Different Crops
More Income

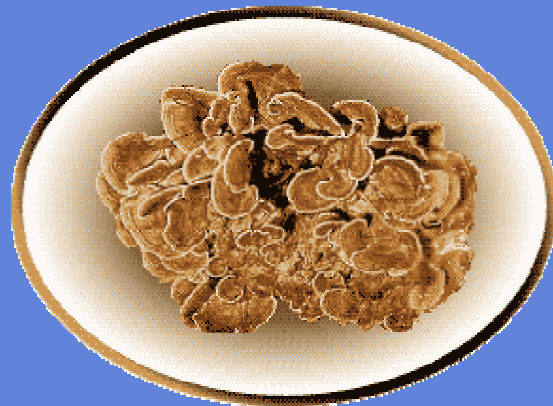
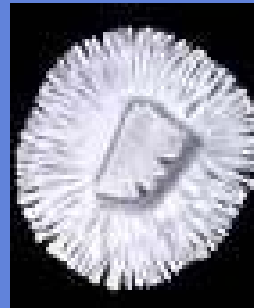


In snow, no heat



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Power for Mushroom Growing Equipment



- High Nutrition
- Medicinal Qualities
- Hyacinth Control
- Wastewater Improvement
- Additional farming income from agricultural waste
- Expands animal feed
- More biogas energy



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No Waste



Coffee/tea agricultural waste used for growing mushrooms. Harvest earth worms, residue becomes animal feed, animal waste used for heating with solar fans to dry the crops.



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Solar Nutrition

Fun

Missing vitamins
and nutrients

Treats and Income

Solar produced and
preserved desserts
with high nutrition
ingredients



Eutectic
Portable
Freezers



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Communications, Internet Access



Village Cooperatives
Connecting with
Resources



Long Distance Learning

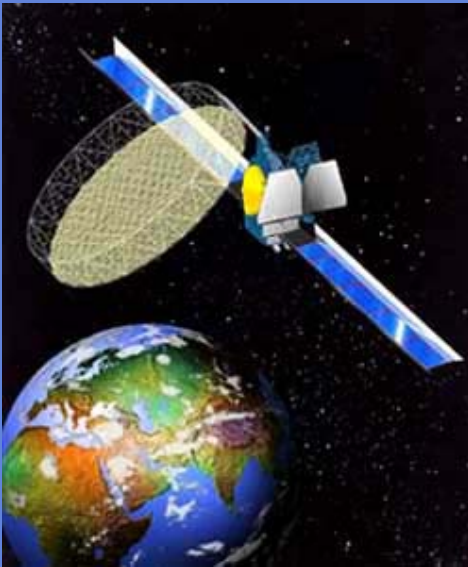
Telemedicine

Crop Market Conditions

Research

Business Training and

Consulting



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Well Drilling, Pump Service



\$4000 to drill a well . . .

\$4000 to buy well drilling equipment



Truck and trailer with drilling and pumping equipment for 5 new wells



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Village Water Shop



In just the
Gangetic Delta
Up to 90 million
people with
dangerous
water arsenic
levels

In Mali, half the children
die before age 5

135 million worldwide
by 2020



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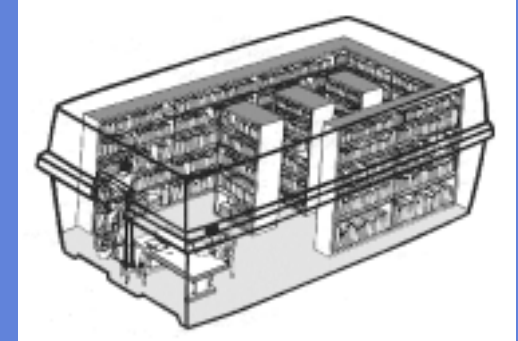
More Microenterprises



Wood-working Shops



Mobile Music



**Portable
Library Service**



**Village
Video
Theater**



Solar Cookers



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Solar Power for Better Production



**Solar-powered
Sewing**



**Lighting
and tools
for a
repair
business**



**Solar kick-wheel
for better
pottery**



**Lighting and
tools for wood
carving**



**12V DC
Tools**



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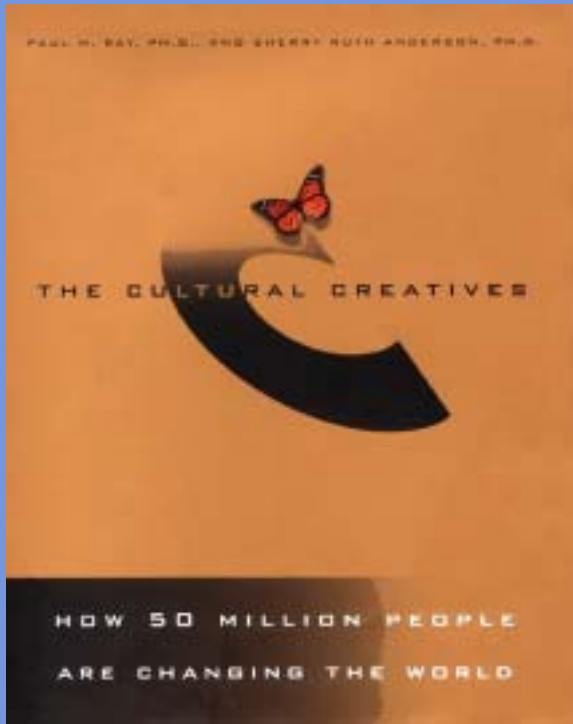
Village Products

Marketing goods from Villages



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Marketing in North America and Europe



50 million USA
high income
adults, 80-90
million European
Union “Cultural
Creatives”

willing to pay more
and buy based on
environmental and
social concerns

“Beyond Organic”

Coffee, tea, food
products grown
without chemicals
and processed with
renewable energy

“Made With
Renewables”

Value added for
goods made with
solar and other
renewable energy



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Marketing in Developing Countries

A huge demand in developing countries for low-cost microenterprise and renewable energy tools

1.1 Billion People
without safe
drinking water

2 Billion People
without Lighting



Global Eco-
Village Network

15,000 Villages
worldwide joined
together by visions of
sustainability and
cooperation



1.5 Billion
people have
no home or a
substandard
building



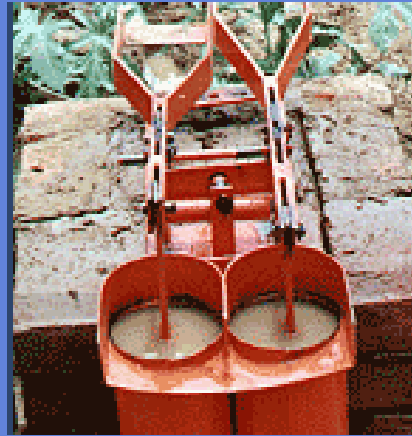
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Foot Powered Water Pumping

1.2 million sold in
Bangladesh



**Bamboo Treadle
Pump \$9**



**Metal
Treadle \$26**



**River Pump
\$35**

**Plastic Treadle
Pump \$17**



**Concrete
Pump \$17**



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Mini-Manufacturing



Drip Kits
\$5 - \$25



Water Storage
1,500 liters \$40



Ceramic
Filters \$8



Pot-In-Pot
Refrigeration
Systems



Arsenic
Filters \$7



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Micro-Manufacturing



**Ram Pump
Making**



**Teaching, Making
Solar Cookers**



**Workshops, demos,
classes**



**LED DC light
assembly**



**Fly Wheel
Generators 1/2
hour cranking =
5 hours of light**



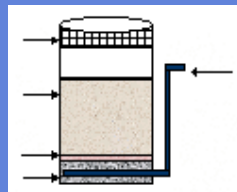
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Micro-manufacturing

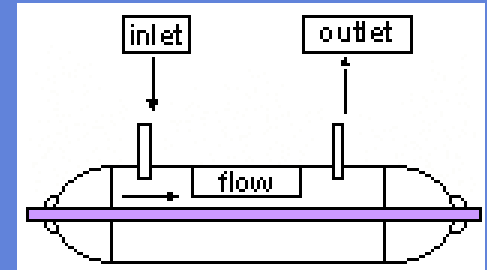


**Bamboo Bridge
Building**

**Inexpensive
Sanitation Systems
(2.4 billion lack)**



**On-Site
Built Sand
Filters**



**\$35 UV Water
Purification made
from PVC pipe**



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Micro-PV manufacturing



**Villagers cut broken solar cells,
assemble into low-cost modules**

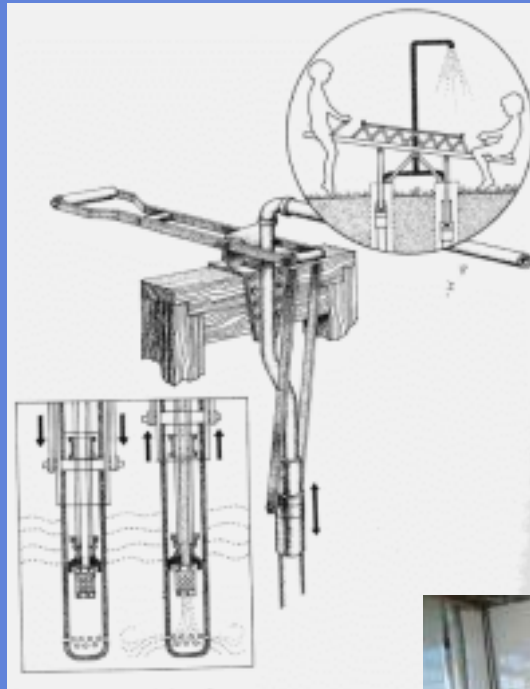


**Village assembly of charge
controllers, cables, safety
equipment**

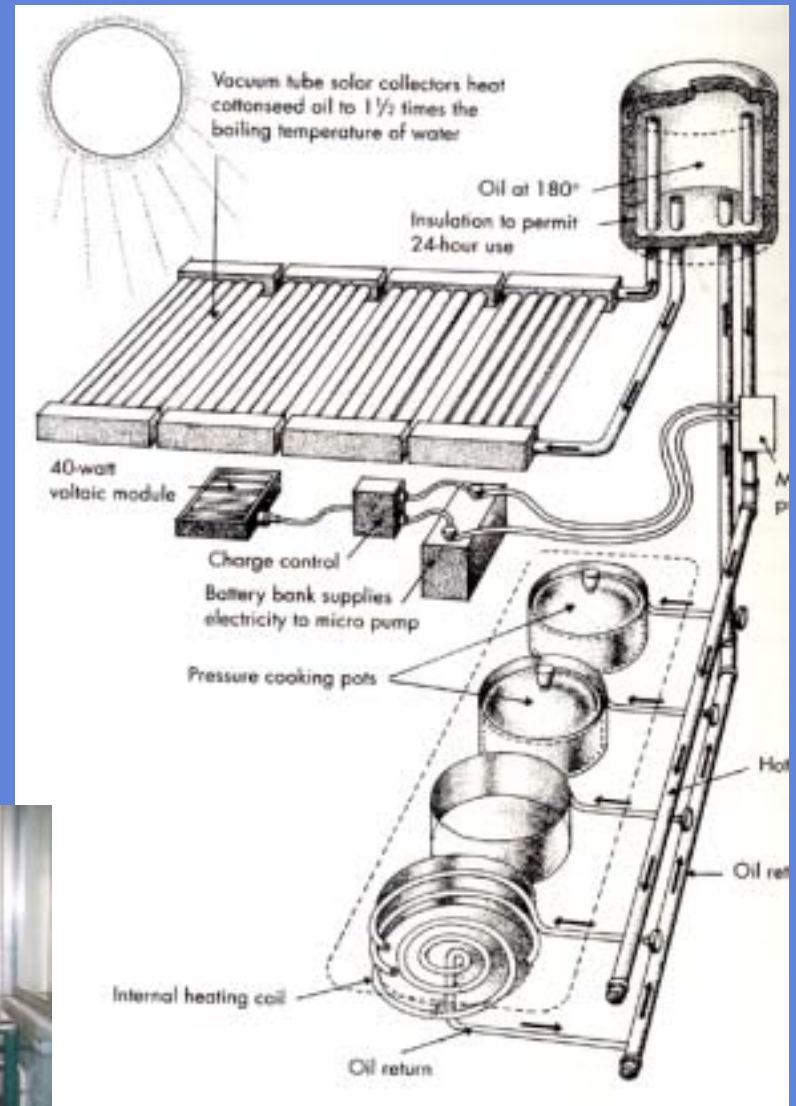


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New Inventions



Playground Water Pumps



Solar Oil Pressure Cookers



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Products for Villagers



Solar Water Purification

Bio gas generators
Cinva Rams
Hydroponics
In stream pumps
Manual sugar cane crusher
Manual well driller
Micro Hydro
Peanut sheller
Pedal power cassava grinder
Pedal soil washing machine
Planting machines
Ram Pumps
Remote, dual hydraulic pumps
Sleeve Pumps, double action
Solar distillers
Solar Refrigerator
Solar water systems
Solar Oil Pressure Cookers
Wind generators, pumps



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The Impact of Microenterprise



Foot-powered Pumps

Tools to start Business
In Kenya, in less than 10
years, 26,000 new
businesses started
Already 0.5% Kenya GDP
650 new per month now
\$32 million per year
in new profits



Hand tools for building,
transportation, sanitation,
water pumping, hay baling,
well drilling



Cooking Oil Press



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Lighting ME Financing



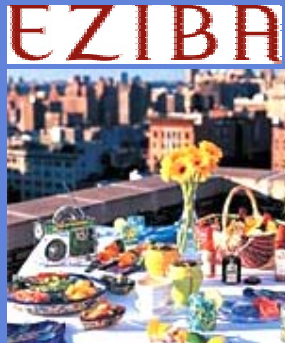
Payment to Dealer



Community organization



Solar installation



Marketing in the USA, Europe



Finished goods



Solar lights



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Microfranchise

... assuring more
microenterprise success.

Ongoing business skills
support -

Accounting

Marketing

Strategic planning

Budgeting

Advertising



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Resources Needed



Training Workshops

Renewable Energy Engineering

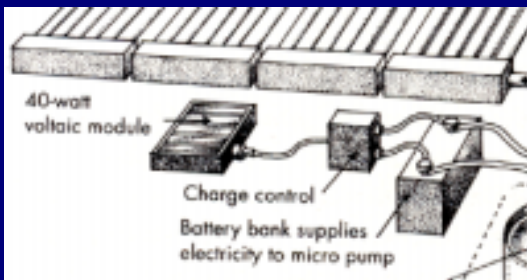


Systems Integrators evolve businesses for repair, maintenance, and future systems

Networking



Micro-Business Development



New Product Creation



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Summary

Productive Uses of Solar Energy



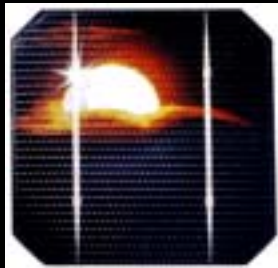
More Jobs

Education

EcoTourism

Medical Clinics

Microenterprise



Better Health and Nutrition

Environmental Preservation

Exports of village crafts

Exports of products

for villagers



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